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**BACTERIAL ISOLATES FROM THE PHARYNX AND CLOACA OF THE PEREGRINE FALCON (*FALCO PEREGRINUS*) AND GYRFALCON (*F. RUSTICOLUS*) (BACTERIA FROM FALCONS)**

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*Abstract*

Swabs taken from the pharynx and cloaca of Peregrine Falcons (*Falco peregrinus*) and Gyrfalcons (*Falco rusticolus*) yielded many species of bacteria, including *E. coli*, *Proteus* sp., *Staphylococcus aureus*, *Pasteurella anatipestifer*, and *Pseudomonas aeruginosa*. Some of these organisms may be significant in the context of raptor disease.

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### Introduction

The determination of normal bacterial floral populations in the gastrointestinal tracts of wild raptors has received little attention. Such knowledge would help in the recognition of potential pathogens in these birds. Field studies involving the Peregrine Falcon and the Gyrfalcon by one of the authors (WB) presented an opportunity to sample the bacterial flora of these threatened falcons, since nestling and adult birds were being handled for banding purposes.

During the fall of 1972 pharyngeal swabs were taken from seven wild Peregrine Falcons trapped on their southward migration. For comparative purposes, pharyngeal swabs were also taken from seven captive peregrines. In the spring of 1973 pharyngeal and cloacal swabs were taken from 25 nestling Peregrine Falcons and 13 young Gyrfalcons from Greenland eyries.

Samples were transported from the field to the laboratory in thioglycolate medium (1972) and Stuart's improved transport medium (1973) which were packed in ice. Subsequent laboratory culture, isolation, and identification followed standard microbiological techniques for aerobic bacteria.

### Discussion

A large number of organisms, of many different species, was isolated from the pharynx and cloaca of both *F. peregrinus* and *F. rusticolus*. Since this study was intended primarily as a survey, it would be wrong to attempt too detailed an interpretation of the findings, especially on a quantitative basis, but certain points should be made.

Many of the organisms isolated are well recognized as part of the bacterial flora of raptors. Examples are *E. coli* and *Proteus* spp., both of which have been reported in previous surveys (Cooper 1973). *Staphylococcus aureus* is a potential pathogen of birds of prey, where it often results in infections of the feet ("bumblefoot"). Its isolation from the pharynx of captive peregrines but not from free-living birds of either species is of considerable interest. In a previous paper Cooper and Needham (1976) postulated that captive raptors might acquire their staphylococci from human sources, and the findings in the present study could support this postulation. *S. epidermidis*, however, was isolated from both free-living and captive birds.

One of the most significant isolates in this survey was probably *Pasteurella anatipestifer*, which is a known pathogen of waterfowl. As may be seen in Table 1, four out of seven free-living peregrines yielded this organism. All seven were trapped on the eastern coast of the United States while on passage south in October, and it is possible that the *P. anatipestifer* was acquired from diseased waterfowl.

Table 1. Isolates from Wild Trapped Peregrines 1972

Organisms	Number of birds (total of 7)
<i>Staphylococcus epidermidis</i>	5
<i>Klebsiella pneumoniae</i>	4
<i>Escherichia coli</i>	4
<i>Pasteurella anatipestifer</i>	4
<i>Streptococcus</i> sp.	3
<i>Enterobacter</i> sp.	3
<i>Pseudomonas aeruginosa</i>	2
<i>Bacillus</i> sp.	1

Table 2. Isolates from Captive Peregrines 1972

Organisms	Number of birds (total of 7)
<i>Streptococcus</i> sp.	5
<i>Bacillus</i> sp.	4
<i>Escherichia coli</i>	4
<i>Enterobacter</i> sp.	3
<i>Klebsiella pneumoniae</i>	2
<i>Staphylococcus aureus</i>	2
<i>Staphylococcus epidermidis</i>	2
<i>Pseudomonas alcaligenes</i>	1
<i>Achromobacter anitratus</i>	1
<i>Neisseria pharyngitis</i>	1
<i>Neisseria catarrhalis</i>	1
<i>Proteus mirabilis</i>	1

Table 3. Isolates from Nestling Peregrines 1973

Organisms	Number of pharyngeal isolates (total of 25)	Number of cloacal isolates (total of 25)
<i>Streptococcus</i> sp.	12	13
<i>Escherichia coli</i>	7	10
<i>Staphylococcus epidermidis</i>	6	6
<i>Enterobacter cloacae</i>	2	2
<i>Proteus mirabilis</i>	1	2
<i>Corynebacterium xerosis</i>	1	0
<i>Proteus rettgeri</i>	0	1

Table 4. Isolates from Gyrfalcons 1973

Organisms	Number of pharyngeal isolates (total of 13)	Number of cloacal isolates (total of 13)
<i>Escherichia coli</i>	6	5
<i>Streptococcus</i> sp.	5	5
<i>Staphylococcus epidermidis</i>	5	0
<i>Haemophilus aphrophilus</i>	1	5
<i>Proteus mirabilis</i>	0	3
<i>Proteus vulgaris</i>	0	1
<i>Actinobacillus</i> sp.	1	0

*Pseudomonas aeruginosa* is ubiquitous in nature and can occur as part of the intestinal flora of both mammals and birds (Bailey and Scott 1970). However, it can also cause disease in raptors, especially if wounds become infected, and it is noteworthy that therapy of such cases is frequently difficult.

The role and significance of many of the bacteria isolated remain uncertain. It is probable that birds of prey have a degree of resistance to some bacteria and that the isolation of the organism is not, per se, indicative of pathogenicity. It is also likely that contaminated prey could be the source of the infection and that the bacterium would not, under normal circumstances, persist for any length of time in the raptor host. Despite great advances in our understanding of raptor pathology in the past ten years (Cooper 1978, Keymer 1972, Trainer 1969), much remains to be learned of the importance of many organisms, among them bacteria. Such information could prove useful in studies on free-living raptor populations where predator/prey pathogen relationships are as yet little understood.

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## ANNOUNCEMENT

### NOTICE OF SYMPOSIUM ON THE BALD EAGLE IN WASHINGTON

A symposium to review past research on the American Bald Eagle in Washington and to stimulate further investigation of this threatened species will be held June 14–15, 1980, at the City of Seattle Aquarium, co-sponsored by the National Wildlife Federation, Seattle Aquarium, Seattle Audubon Society, Seattle City Light, Seattle Woodland Park Zoological Gardens, The Nature Conservancy, U.S. Forest Service, U.S. Fish and Wildlife Service, and Washington Department of Game. Preregistration is recommended as limited space is available. Interested persons should forward \$5 to cover registration fees to Washington Bald Eagle Symposium, c/o Jeremy Robertson, 2357 N.W. 70th, Seattle, WA 98117; phone (206) 789-6056; by May 31. A published copy of the symposium proceedings is included in registration fees.